state, &c.). The hypothesis is advanced, that the ethereal atmosphere condensed round an atom by its attractive action consists of an atmosphere of luminiferous ether, and an envelope of electric ether immersed within this for a certain depth, an ethereo-electric atmosphere, in fact.—Some observations on flocculation of small particles (or their tendency to form, under moderate agitation, granular aggregates or compound particles of larger size), are described by Prof. Hilgard, and have important physical and technical bearings, especially on points in agriculture.—Prof. Dawson points out what he considers defects and errors in the method of investigation pursued by Prof. Möbius recently with regard to *Eozoon canadense*, leading to a decision adverse to the organic character of that object.—Mr. White offers some remarks on the Jura-trias of Western North America; Mr. Fontaine continues his notes on the mesozoic strata of Virginia, and Mr. Bannister contends for the hypothesis of the transition character of the Rocky Mountain lignite series, or Laramie group.—Some new species of anthozoa and cephalopoda added to the marine fauna of the eastern coast of North America, are described by Prof. Verrill; the cephalopoda have some specially interesting features.—Mr. Penfield gives analyses of triphylite.

Annalen der Physik und Chemie, No. 2.—In this number Herr Thoss communicates an interesting paper on artificial dichroism. He experimented (to produce it) in the three directions of making a coloured isotropous medium doubly refractive, colouring a doubly-refractive medium, and giving a colourless isotropous medium both colour and double refraction. The last series were negative in results. In the first series, plates of gutta-percha, indigo, and chrysamminate of potash gave convincing proof that there is no difference between double refraction produced mechanically and double refraction in crystals. It was found impossible to produce dichroism with pressure in coloured glass. Colouring matter in crystals is considered the real producing cause of dichroism. The subject of quickly alternating electric currents is treated by Herr Oberbeck, who notes as an important fact the diminution of the resistance of liquids by increase in the number of alternations of the transmitted current in unit time; this occurs only when the number becomes high, and the average time of passage of one constituent molecule to its neighbour in the direction of the current can no longer be regarded as infinitely small in comparison to the duration of the current. The author describes experiments on alternating currents in two induction coils, variously connected, and finds in the phenomena certain analogies to vibrations of the nature of sound and light.—Herr Lubarsch endeavours to show that the faultiness of past experiments on fluorescence has arisen only from the first of three causes assigned by Prof. Lommel, viz., absorptive action of the fluorescent liquid on the fluorescent light, in observation of the liquid mirror. He finds evidence of the generality of this law: in all fluorescent substances the more refrangible limit of the derived spectrum coincides with the place of strongest absorption in the absorption spectrum, or (where this is not distinctly perceptible) with the place of strongest fluorescence in the fluorescent spectrum. Substances with double fluorescence, as chlorophyll (the phenomena of which he describes), are not excepted from the law.—Herr Rudorff describes a simple and convenient apparatus for determining the specific gravity of powdered substances; Herr Wiedemann and Herr Schulze, an arrangement with which can be proved the dissociation of hydrate of chloral at 100°; Herr Wiedemann, experiments yielding the result that by passage of electricity a gas may become luminous far under 100°, &c.—A large part of the number is occupied with the concluding part of Kohlrausch's paper on electric conductivity, &c., already referred to.

Journal de Physique, February, 1879.—The opening paper by M. Jamin, on complements to the theory of dew is followed by one in which M. Lippmann shows that the depolarising property of a metallic solution is limited to the same metal as it contains; and that this electric reaction may be applied, in several cases, in testing for a metal, as a convenient auxiliary of chemical analysis. The electric work expended to produce polarisation is stored (he contends) not in the form of chemical energy, but in that of electrical, as in a condenser.—M. van der Mensbrugghe offers some remarks on measurement of the superficial tension of liquids, *apropos* of recent experiments by M. Terquem.—M. Gernez describes a method of observing the rotatory power of quartz at different temperatures, and which seems to meet the difficulties of the case better than that of M. Joubert and other physicists. Two quartzes of contrary rotation are fixed at the two ends of a tube, and only one is heated. A universal support or electro-diapason for inscribing and showing in projection vibratory movements is described by M. Duboscq.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, March 27.—"On the Organisation of the Fossil Plants of the Coal Measures. Part X." By W. C. Williamson, F.R.S., Professor of Natural History in Owens College, Manchester.

The still existing differences of opinion respecting the botanical affinities of the Sigillariæ give value to every new fact calculated to throw light upon the question. In 1865 Mr. Edward Wunsch, of Glasgow, made a discovery, which proves to have an important bearing upon it. He found, at Laggan Bay, in Arran, a series of rather thin carboniferous strata, separated by thick beds of volcanic ash, and in one of the carboniferous shales especially, he discovered the bases of the stems of numerous very large trees standing perpendicularly to the shales. These trees have been referred to by several authors as Sigillarian. In the summer of 1877 Mr. Wunsch and I employed quarrymen to make extensive excavations amongst these strata, for the purpose of adding to the extensive series of specimens which he had obtained, and the whole of which he kindly placed in my hands. The aggregate result of these explorations was to show that the conclusion previously arrived at, viz., that the stems had belonged to a grove of Sigillarian trees, was unsupported by a solitary fact. These stems were of very large size, showing that they had belonged to fully grown trees. None of them displayed any traces of leaf-scars, having outgrown the stages at which such scars would remain visible. Their outer surfaces were scored with deep irregular longitudinal fissures, resulting from internal growth and consequent expansion, and which appear to have been mistaken for the longitudinal grooves and ridges of a Sigillarian bark. Such, however, they certainly were not, since, in every instance, the surface bark had been entirely thrown off, and the fissures entered deeply into the subjacent bark layer. In most of the stems this comparatively thin bark layer was the only one that remained, the greater portion of the inner bark and the central vascular axis having disappeared, leaving a large cylindrical cavity, which was filled up with volcanic ash. These stems failed to display a single feature justifying the conclusion that they were Sigillarian.

In two of them the central cavity, instead of being filled with ash, was filled with miscellaneous heaps of vegetable matter, amongst which were large fragments of the vascular axes of various plants, such as Lepidodendra and Stigmariæ, but in one of the largest stems were five or six decorticated vascular cylinders of Diploxyloid stems, of the largest size, and which, though arranged parallel to the long axis of the cylinder which inclosed them, obviously did not belong to them, but had been floated in from without. The supposition that these had been young stems that had grown within the hollow protecting cylinders, from spores, accidentally introduced, is wholly untenable, since each one of these several vascular axes has been the centre of a stem fully as large as that within which we found them aggregated. Of course, these Diploxyloid vascular axes had the organisation which Brongniart and the younger school of French botanists which still upholds his views on this point, believe to be characteristic of true Sigillariæ—a conclusion from which I have long dissented.

The only fragments we found, that threw any light upon the character of the leaf-scars that had indented the surfaces of these fully-grown stems, was a well-defined example of the Lepidodendroid type.

We directed careful attention to the nature of the smaller fragments of branches and foliage which abounded in the volcanic ash with which the large stems were overlaid. These consisted of Lepidodendroid branches and twigs of all sizes and ages, and no doubt was left upon my mind that they were really the *disjecta membra* of the stems around which they were so profusely scattered. The only fruits that have been obtained from the same locality are Lepidostrobi, most of which contain macrospores and microspores. Unless we are prepared to believe that this Arran deposit contained, on the one hand,

numerous stems without branches, and, on the other, yet more numerous branches without stems, we must recognise in these specimens the complementary elements of a grove of Lepidodendroid trees.

One specimen found is a very important one. It has a mean diameter of six inches, and is either a small stem or a very large branch. Internally it exhibits the same structure as all the smaller Lepidodendroid branches, except so far as it is modified by size and age. But in addition to its other features, it exhibits *a very narrow* exogenous ring surrounding the ordinary Lepidodendroid one, thus giving some clue to the size attained by such branches before the internal organisation passed from the Lepidodendroid to the Sigillarian type.

The important discovery by Mr. D'Arcy Thompson, of Edinburgh, of young branches of Ulodendron with reproductive cones actually attached to the scars characteristic of the genus, finally settles the nature and functions of these scars, showing that they mark the positions from which bilaterally arranged deciduous organs of fructification have fallen.

The structure of *Calamostachys Binneyana* has had further light thrown upon it, sustaining my previously expressed convictions that it had a triquetrous axis, and that consequently its affinities were with Asterophyllites and Sphenophyllum, and not with Calamites. A specimen demonstrates that the six vascular bundles going to the six fertile sporangiophores were given off in pairs from the three truncated angles of a triangular vascular axis—an orientation absolutely indentical with that represented in similar sections of stems of Sphenophyllum, published by M. Renault. The recent discovery by Herr Stur, of Vienna, of a plant in which Sphenophylloid and Asterophyllitean leaves are found upon a common stem, establishes the correctness of my previous conclusions, as to the very close affinities of these two genera.

A large series of specimens from Oldham and Halifax has enabled me to investigate in detail the very curious objects to which Mr. Carruthers gave the name of Traquairia, and which that observer believes to be a form of Radiolarian life. Their very elaborate organisation can scarcely be made intelligible without the aid of plates. In a previous memoir (*Phil. Trans.* 1874, p. 56), I ventured to doubt the correctness of Mr. Carruthers' conclusions, and expressed my conviction that these objects resembled spores rather than protozoan skeletons. Further study of their details of structure has only strengthened this opinion which has also received the important support of Professors Hæckel and Strasburger, of Jena, both of whom have carefully studied my collection of specimens. These objects are small spheres—the sphere-wall of which is prolonged into a series of long radiating tubes not unlike the muricated species of a Cidaris. In their young state each murication gives off a delicate thread or threads, which ramified freely in an apparently mucilaginous or gelatinous, structureless, investing magma. In older specimens these threads developed into branching and radiating cylindrical tubes which, like the primary ones, had very thin walls. Within the outer sphere-wall, which consists of the coalesced bases of these branching tubes, were at least two other thin layers of membrane, and in several of the specimens the interior of the capsule is filled with cells, exactly like those seen in the corresponding cavities of Lycopodiaceous macrospores found in the Halifax deposits from which the finest Traquairiæ have been obtained. These objects differ considerably from all known reproductive structures; but I agree with Prof. Hæckel in his very decided rejection of them from the Radiolarian group of organisms, and with his conclusion that they are vegetable and not animal structures. Prof. Strasburger thinks it most probable that their affinities are with the macrospores of the Rhizocarpæ.

Myriads of the vegetable fragments both from Oldham and Halifax are drilled in all directions with rounded insect or worm borings, and further traces of these zylophagous animals are seen in innumerable clusters of small Coprolites of various sizes, the size of those composing each cluster being uniform.

Desirous of verifying Count Castracane's alleged discovery of Diatoms in coal, specimens of twenty-two examples of coal from various localities in Yorkshire, Lancashire, and Australia were reduced, after the Count's method, to a small residue of ash. This work was done for me in the chemical laboratory of Owens College through the kindness of Prof. Roscoe. Like Mr. F. Kitten, of Norwich, the Rev. E. O'Meara, of Dublin, and the Rev. G. Davidson, of Logie Coldstone, I have failed to discover the slightest trace of these organisms in coal.

The last objects described are some minute organisms from the carboniferous limestones of Rhydmwyn, in Flintshire, and which were supposed by Prof. Judd to have been siliceous Radiolarians from which the silica had disappeared and been replaced by carbonate of lime. I fail to find any confirmation of this conclusion. The objects appear to me to constitute an altogether new group of calcareous spherical organisms that may either have been allied to the Foraminifera or have had some affinities with the Rhabdoliths and Coccoliths. I have proposed for several species of the organisms the generic name of Calcisphæra. Myriads of objects of similar character, but of larger size, constitute the greater portion of a Corniferous limestone from the Devonian beds of Kelly's Island, U.S.A.

Additional light is thrown upon some Lycopodiaceous Strobili, fern-petioles, *Sporocarpous* or cryptogamic conceptacles, and other spore-like bodies, Gymnospermous seeds and stems.

Chemical Society, March 20.—Dr. Gladstone, president, in the chair.—The following papers were read :—On plumbic tetrethide, by E. Frankland and A. Lawrance. The authors prepared this compound by adding plumbic chloride to zinc-ethyl, and distilling the product in a current of steam. Ammonia, carbonic anhydride, carbonic oxide, cyanogen, nitric oxide, oxygen, and sulphuretted hydrogen, do not act on this substance at ordinary temperatures; sulphurous anhydride converts it into a white amorphous mass, consisting of diethylsulphone and plumbic ethylsulphinate.—Prof. W. Foster gave a verbal communication on the production of the higher oxides of iron, chromium, manganese, and bismuth. When the salts of the above metals are treated with an alkaline solution of sodic hypobromite, ferrates, chromates, permanganates, &c., are formed, oxygen being evolved. Copper sulphate solution, when mixed with the hypobromite solution, evolves oxygen at ordinary temperatures. —On the decomposition of water by certain metalloids, by C. F. Cross and A. Higgin. The authors conclude that pure sulphur decomposes water, uniting both with its oxygen and hydrogen; the decomposition is independent of atmospheric oxygen. Amorphous phosphorus decomposes lead acetate solution, but is without action on water at 100°. Vitreous phosphorus does not decompose water at 100° when air is excluded.—On the volumetric determination of chromium, by W. J. Sell. To the boiling solution containing chromium, acidified with sulphuric acid, permanganate is added until a pink tint remains after boiling for three minutes; the manganese is precipitated by the addition of sodium carbonate and alcohol, and filtered off; the chromic acid in the filtrate is then determined by iodine and hyposulphite. The author also gives details of a method of fusing chrome iron ore, by means of which an estimation of the chromium can be made in an hour and a quarter.

Geological Society, March 12.—Henry Clifton Sorby, F.R.S., president, in the chair.—Lazarus Fletcher, Arthur Samuel Hamand, William J. Pope, and George W. Slatter, were elected Fellows of the Society.—The following communications were read :—On perlitic and spherulitic structures in the lavas of the Glyder Fawr, North Wales, by Frank Rutley, F.G.S. He mentioned the fact that the lavas of Bala age in Wales were generally vitreous, and instanced some remarkable cases of spherulitic structure from that district. Prof. Judd stated that among the most ancient rocks of the north-west of Scotland were lavas showing spherulitic and fluidal structure. These were also common in the old red sandstone lavas. He thought that as the spherulitic, perlitic, and fluidal structures were in rocks of modern date confined to vitreous varieties, the inference was safe, when applied to ancient rocks, that they were once glass. Dr. Sheibner asked if an analysis of the rock had been made. If the rock was a true perlite, there should be about 80 per cent. of silica. If the rock was altered, one might expect a large excess of magnesia. Prof. Ramsay said that the character of these lava-flows was evident even without microscopic examination. He recapitulated the evidence which had persuaded him of this when surveying the district, and expressed doubt as to the rocks at the base of the Cambrian in North Wales being true lava-flows. Dr. Hicks said he thought there was no reason why a perlitic structure should not occur in rocks of Bala age. He thought the first spherulitic rocks recognised in this country had come from rocks of Arvonian age at St. David's. Mr. Bauerman said that modern lava-flows often cover very large areas, as in North America and India; so the mere distance of the Wrekin from Wales would be no difficulty. Mr. Rutley doubted whether spherulitic structure was

always connected with vitreous. He did not see that the presence of magnesia would prove or disprove alteration. He did not think a rock could be vitreous if solidified at a great depth, since it would hardly be able to cool with sufficient rapidity.—The gold-leads of Nova Scotia, by Henry S. Poole, F.G.S., Government Inspector of Mines. The author remarked upon the peculiarity that the gold-leads of Nova Scotia are generally conformable with the beds in which they occur, whence Dr. Sterry Hunt and others have come to the conclusion that these auriferous quartz veins are interstratified with the argillaceous rocks of the district. With this view he does not agree. He classified the leads in these groups according to their relations to the containing rocks, and detailed the results of mining-experience in the district, as showing the leads to be true veins by the following characters:—(1) Irregularity of planes of contact between slate and quartz; (2) The crushed state of the slate on some foot-walls; (3) Irregularity of mineral contents; (4) The termination of the leads; (5) The effects of contemporary dislocations; (6) The influence of strings and offshoots on the richness of leads. The author further treated of the relative age of the leads and granite, and combated the view that the granites are of metamorphic origin, which he stated to be disproved by a study of the lines of contact. He also noticed the effects of glaciation on the leads, and the occurrence of gold in carboniferous conglomerate.—On conodonts from the Chazy and Cincinnati groups of the cambro-silurian, and from the Hamilton and Genesee-shale divisions of the devonian, in Canada and the United States, by G. Jennings Hinde, F.G.S. After a sketch of the bibliography of the subject, the author described the occurrence of conodonts. In the Chazy beds they are associated with numerous *Leperditiæ*, some trilobites, and gasteropods; in the Cincinnati group with various fossils; and in the devonian strata principally with fish-remains; but there is no clue to their nature from these associated fossils. They possess the same microscopic lamellar structure as the Russian conodonts described by Pander. The various affinities exhibited by the fossil conodonts were discussed; and the author is of opinion that though they most resemble the teeth of myxinoid fishes, their true zoological relationship is very uncertain. The paper concluded with a classification of the conodonts from the above deposits.—On annelid jaws from the cambro-silurian, silurian, and devonian formations in Canada, and from the lower carboniferous in Scotland, by G. Jennings Hinde, F.G.S. After referring to the very few recorded instances of the discovery of any portions of the organisms of errant annelids as distinct from their trails and impressions in the rocks, the author noticed the characters of the strata, principally shallow-water deposits, in which the annelid jaws described by him are imbedded. A description was given of the principal varieties of form and of the structure of the jaws. They were classified from their resemblance to existing forms under seven genera, five of which are included in the family Eunicea, one in the family Lycoridea, and one among the Glycerea. The author enumerated fifty-five different forms, the greater proportion of which are from the Cincinnati group.

Meteorological Society, March 19.—Mr. C. Greaves, F.G.S., president, in the chair.—The following were elected Fellows of the Society:—R. Burniston, W. H. Crawford, J. Davies, The Earl of Derby, H. Downs, S. Egar, J. S. Hodgson, S. Hollins, T. M. Hopkins, H. Horncastle, C. W. Johnson, E. M. Nelson, and F. Wilkin.—The papers read were:—Dew, mist, and fog, by George Dines, F.M.S. The author has during the last two years made a number of experiments to determine the amount of dew that is deposited on the surface of the earth. The plan adopted was as follows:—Glasses similar to ordinary watch-glasses were procured; the surface area and the weight of each was ascertained. These glasses were exposed to the open air in the evening, being placed on different substances, viz., on grass, on slate, and on a deal board, the two latter being raised a few inches above the grass. A minimum thermometer was generally placed by the side of each glass. It is only on rare occasions that an amount of dew exceeding the 0·010 inch in depth has been deposited upon the measuring glasses, and out of 198 observations, in only 3 has that amount been exceeded. Fifty-eight observations give the amount from 0·010 to 0·005 inch; 107 from 0·005 to 0·001 inch; 22 less than 0·001 inch; and 8 observations no dew at all. The author thinks it may be fairly assumed that the average annual deposit of dew upon the surface of the earth falls short of 1·5 inch. There are two kinds of mist, the morning and evening; the morning mist is caused by the evaporation from the water and the moist ground taking place faster than the vapour is taken away; the air becomes saturated, but this does not stop the evaporation; the vapour continues to rise into the air, is there condensed, and forms mist, which gradually spreads over a wider surface. The evening mist is produced as follows:—The cold on the grass caused by radiation lowers the temperature of the air above it; the invisible vapour of water previously existing in the air is in excess of that which the air can retain when the temperature is lowered; the surplus is condensed, becomes a mist-cloud, and floats in the air just above the surface of the grass. Taken either separately or combined, the mists appear to the author totally and altogether inadequate to account for those dense fogs which at times overspread large tracts of country. Dense fogs near the earth are often accompanied by a clear sky above, when the sun may be seen reflected from the gilded vanes of our public buildings. After long consideration the author is inclined to attribute these fogs to some cause at present unknown to us, by which the whole body of the air to some distance above the surface of the earth is cooled down, and, as a consequence, part of the vapour in that air is condensed and forms what has been called an "earth-cloud."—On the inclination of the axes of cyclones, by the Rev. W. Clement Ley, M.A., F.M.S. The object of this paper is to call attention to the evidences recently afforded by the results of mountain observations to the theory that "the axis of a cyclone inclines backwards." The author first reviews the state of the question up to the present time, and details his own investigations, chiefly founded upon the movement of cirrus clouds; he then refers to Prof. Loomis's recent "Contributions to Meteorology," in which is discussed the observations at the summits and bases of several high mountains, the results of which fully confirm the theory that the axis of a cyclone inclines backwards. The discussion on this paper was adjourned till the next meeting.—Contributions to the meteorology of the Pacific. No. III. Samoan or Navigator Islands, by Robert H. Scott, F.R.S.

Physical Society, March 22.—Prof. W. G. Adams, president, in the chair.—New Member, Capt. Hastings R. Lees, R.N.—Capt. Abney, R.E., F.R.S., read a paper on obtaining photographic records of absorption spectra. Absorption spectra have hitherto been recorded by the difficult method of hand-copying; but the discovery by Capt Abney of a silver salt sensitive to all rays in different degrees renders the photographic method available. The records thus obtained are photographs of the spectrum of the naked light of the source and of that of the same light reduced by insertion of the absorbing material in its track, and these are taken parallel, so that the dark absorption lines can be readily compared. Examples of these were thrown by him on the screen. This method can be used as a new weapon in attacking solar physics and determining whether or not compound bodies exist in the sun. Absorption spectra to compare with the sun can be got for compound bodies by burning the matter in question in a flame in front of the slit and passing a bright light through the flame.—Prof. Guthrie, F.R.S., then read a paper on the fracture of colloids, as illustrated by experiments on the breakage of glass plates either by pressure or heating at the centre or round the circumference. Circular plates of glass, pressed at centre or circumference, break in radial lines. However supported, a plate breaks in the same fashion if heated in the same way. If heated in the middle the crack is peak-shaped, like an obelisk on a double pedestal, two cracks forming the outline, with sometimes a third down the middle. The two cracks unite before they reach the edge on one side, and (as afterwards pointed out by Prof. W. G. Adams) the three extremities of the two cracks all meet at right angles to the edge. The crackage varies with the size and shape of the plates, the flame, and kind of glass; but the type is the same for all. Cracks cross each other. Prof. Guthrie defined a crack as the line where the ratio of cohesion to strain is least, and likened it to the lightning flash. Mr. W. Chandler Roberts, F.R.S., said that he had observed once a volute spiral crack in dried hydrated silicic acid, and recommended Prof. Guthrie to study cracks in agate, which is the most perfect colloid known.

GENEVA

Society of Physics and Natural History, November 6, 1878.—M. Raoul Pictet read a paper on temperature and on the general synthesis of all calorific phenomena. The purpose of this research is to prove the absence of rigorous definition of the word "temperature," the *petitio principii* on which the construc-

tion of all thermometers rests, and the confusion which exists in most of the treatises on physics between the terms: heat, sensible heat, latent heat, and temperature.—M. Arthur Achard described certain considerations relative to the useful effect of magneto-electric machines, and spoke especially on some experiments made by Prof. Hagenbach of Bâle with a Gramme machine (see *Archiv des Sc. Phys. et Nat.*, vol. lxiv. p. 332).—Prof. Schiff spoke of the electric currents observed in animals. Most of them proceed from the glands of the skin, which are veritable electrical apparatus. If we destroy the skin or cauterise it, currents are produced which are attributed to the muscles, but which proceed from the movements of the animal. The observations were made on the protics.

November 21, 1878.—Prof. Soret communicated the results of his researches on absorption spectra by means of the eye, especially with respect to ultra-violet radiations. He operated on the eyes of oxen and calves, and he found that the ultra-violet radiations were transmitted as far as the S line. The aqueous humour allows them to pass as far as V. The vitreous substance has a transparency much greater than the aqueous humour.—M. Raoul Pictet presented several considerations on the passage to a liquid state of compressed gases, and in that state the limit which is produced for each gas at a certain pressure and a certain temperature.

December 5, 1878.—M. J. M. Crafts showed a new thermoscope, a description of which he recently published, and the air-reservoir of which is only $\frac{3}{10}$th of a cubic centimetre. From experiments made with this instrument he concludes that the physical characteristics of different bodies are much less dissimilar at high than at low temperatures.—Prof. Schiff experimented before the Society on a seismograph of M. Ziegler, consisting of a tube of gold-beater's skin, with which he envelopes the member whose variation of volume he wishes to measure, corresponding to the beatings of the pulse. This large tube communicates its impressions to a registering apparatus by means of a very narrow tube.—Prof. Joh. Müller gave an account of very delicate microscopic observations made by him and M. Minks on lichens, and overthrowing definitely the theory of Schwendler (See *Arch. des Sc.* Jan. 1879, p. 49).

PARIS

Academy of Sciences, March 24.—M. Daubrée in the chair.—The following papers were read:—On the slow changes undergone by wine during its conservation, by M. Berthelot. These observations relate to bottles of port 100 and 45 years old respectively, which the author analysed. *Inter alia*, the cane-sugar in the older wine had disappeared almost completely; and there was very little in the other. The wines must have lost more than a fourth of their acidity through etherification. The amount of cream of tartar was much under the normal solubility. The alcohol was in like proportion to that of recent port, there had been little change in it, therefore, probably. As to gases, one litre of the wine contained 12·4 cc. oxygen, and 32·3 cc. nitrogen, without carbonic acid; corresponding to normal saturation of the wine by the gases of air. In saturation with oxygen this old wine contrasts with recent Burgundy wines, which have no trace of it in solution, but which contain CO_2, while the old ports have parted with this through diffusion.—Remarks on some points of crystallogy, by M. Lecoq De Boisbaudran. He makes inferences from the unequal resistances of different faces of a crystal to change of state. The solubility of the crystal must vary with its exterior form. The peculiar mode of regeneration of mutilated crystals is easily explained; also the influence of rapidity of growth on relative development of the different parts of a crystal, &c.—Communications on several geographical questions, by M. de Lesseps. These relate to inter-oceanic canals and a conference on the subject, to be held in Paris on May 15; news from M. Soleillet on the banks of the Niger, and from Serpa Pinto, announcing important discoveries on the course of the Zambesi; news also from M. Roudaire at Gabes.—Addition to a previous note on damming the Tiber at Rome, by M. Dausse.—Observations of Brorsen's periodic comet, by M. Tempel.—Formulæ relating to perturbations of planets, by M. de Gasparis.—On resolving equations, by M. Pellet.—On the solution in whole numbers of the equation (1) $aX^4 + bY^4 + dX^2Y^2 + fX^3Y + gXY^3 = cZ^2$, by M. Desboves.—Molecular vibrations in magnetic metals during passage of undulatory currents in these metals, by M. Ader. Such vibrations are thus had in all the magnetic metals, and give articulate sounds. To have them in all their intensity, a mechanical action must be opposed to the wires or bars, especially the inertia of two heavy masses at their extremities. The effects of these electrodynamic vibrations, and the conditions of mechanical actions to be opposed to the bars are quite the same as those the author has indicated for electro-magnetic molecular vibrations.—On ytterbine, the new earth of M. Marignac, by M. Nilson.—On *scandium*, a new element, by M. Nilson. The preparation of ytterbine (which he describes) furnished a substance with molecular weight 172·6 instead of 131, indicated by M. Marignac; and M. Nilson was led to suspect the presence of another earth, of lower molecular weight, mixed with the product examined. The spectroscope favoured this idea, and M. Thalen indicates the lines proper to the spectrum of the new earth. The name given to the new element is meant to recall its presence in gadolinite or euxenite minerals, found only in the Scandinavian peninsula hitherto. The atomic weight is under 90. M. Nilson remarks on some of its chemical properties.—On the cyanosulphite of potassium, by M. Etard.—Thermochemical study of alkalino-earthy sulphides, by M. Sabatier.—On various alcoholic iodides and bromides, by MM. De Montgolfier and Giraud.—On the formation of aurine, by MM. De Clermont and Frommel.—On the presence of lithine in rocks and in the waters of seas; consequences relative to saliferous strata and to certain classes of mineral waters, by M. Dieulafait. Lithine is as widely distributed as soda and potash, and accompanies these two bases in all rocks of primordial formation. It exists in the Mediterranean and other seas in such quantity that it can be recognised in the residue of evaporation of even one cubic centimetre. It concentrates notably in the sediments of salt marshes. Marls in small quantity give an intense spectrum of lithine. All waters mineralised in the primordial formation contain lithine, and all waters distinctly saline contain it in exceptional proportion.—Resistance of germs of certain organisms to the temperature of 100°; conditions of their development, by M. Chamberlaud. He describes two forms of *Bacillus*, whose germs have this resistance; boiling water several minutes or even an hour will not kill them.—On the presence in the blood and tissues, under spheroidal form, of certain liquids not miscible in water and which have penetrated through the lungs, by M. Poincaré. Spirit of turpentine and nitrobenzine are among the substances observed to have this effect. The fact bears on respiration of noxious vapours by workmen.—Anatomical and physiological study of nectaries, by M. Bonnier. He rejects Darwin's theory of the *rôle* of nectaries. Nectariferous tissues, floral or extra floral, emitting a liquid or not, form special nutritive reserves in direct relation with the life of the plant.—Experimental researches on the conditions of growth of root hairs, by M. Mer.—On a new disease of the Rubiaceæ of hothouses, by M. Cornu.—On halos and parhelias seen in the park of Saint Maur, by M. Renou.—On the unity of forces in geology, by M. Hermite.

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